

ROOT-KNOT NEMATODES (MELOIDOGYNE SPP.)

D. E. Stokes

Root-knot nematodes are obligate plant parasites, which have been associated with plant maladies since the middle of the last century. Some of the 20 species of root-knot nematodes recognized throughout the world are serious pests of plants, particularly in temperate and tropical zones. Plants attacked by root-knot nematodes include many crop plants of economic importance in many areas of the world. While each root-knot nematode species has a distinct host range, there are many plants attacked by more than one species of the nematode. Some of the plants which may be severely attacked by root-knot nematodes include okra, cotton, fig, tobacco, tomato, squash, and pepper.

Conspicuous galls or knots associated with root-knot nematode injury are usually found on host-plant roots; however, other plant parts may also be attacked. The galls are composed of abnormal tissues induced by feeding action of the nematode, which begins in the second larval stage. An increase in both cell numbers and cell size may be found associated with root-knot nematode feeding. Cells immediately adjacent to feeding sites are abnormally large and are referred to as "giant cells" (Fig. 1). Giant cells contain multiple nuclei and cytoplasm which differ from those of normal cells. Physiological processes are adversely affected in root-knot nematode infested plants due to altered plant cells and blockage by the nematodes inside conducting tissues.

Root-knot nematodes are sexually dimorphic, the male being vermiform and active; whereas, the female is saccate and sedentary. Males may serve in a reproductive capacity, but certain species are capable of reproducing parthenogenetically. Females usually lay most eggs in a gelatinous mass, which protects young nematodes until they hatch and migrate in search of food. Several hundred eggs may be laid by a single female during a lifetime.

Root-knot nematode problems have been recognized in Florida since the late 1800's. Many important crop plants grown in Florida may be severely damaged if controls are not established. Symptoms associated with root-knot nematode-infected plants include stunting, wilting, reduced yield, chlorosis and necrosis. Satisfactory chemical control of root-knot nematode can be attained by treating fields with Dibromodichloropropane (DBCP) (1 to 1-1/2 gallons per acre, active ingredient), Ethylene dibromide (EDB) (4 to 6 gallons per acre) or a mixture of Dichloropropanes and Dichloropropenes (D-D) (4 to 6 gallons per acre). Seedbed treatment to supply field plants reasonably free from root-knot nematode infection can be obtained by use of Methyl bromide (2 lb./100 sq. ft.). Higher rates may be required in treating fields or seedbeds composed of organic or clay soil. Specific nematicidal recommendations should be obtained for individual crops since some plants are sensitive to certain chemicals. Ineffective control by soil fumigation has stimulated interest in such integrated control methods as resistant cultivars, crop rotation, and the use of predators. Resistant varieties of several crop plants are available.

Species of root-knot nematodes known to be in Florida include Meloidogyne javanica, M. incognita incognita, M. incognita acrita, M. arenaria, M. thamesi, M. hapla, and M. javanica bauruensis.

Figure 1 illustrates root-knot nematodes in association with susceptible host.

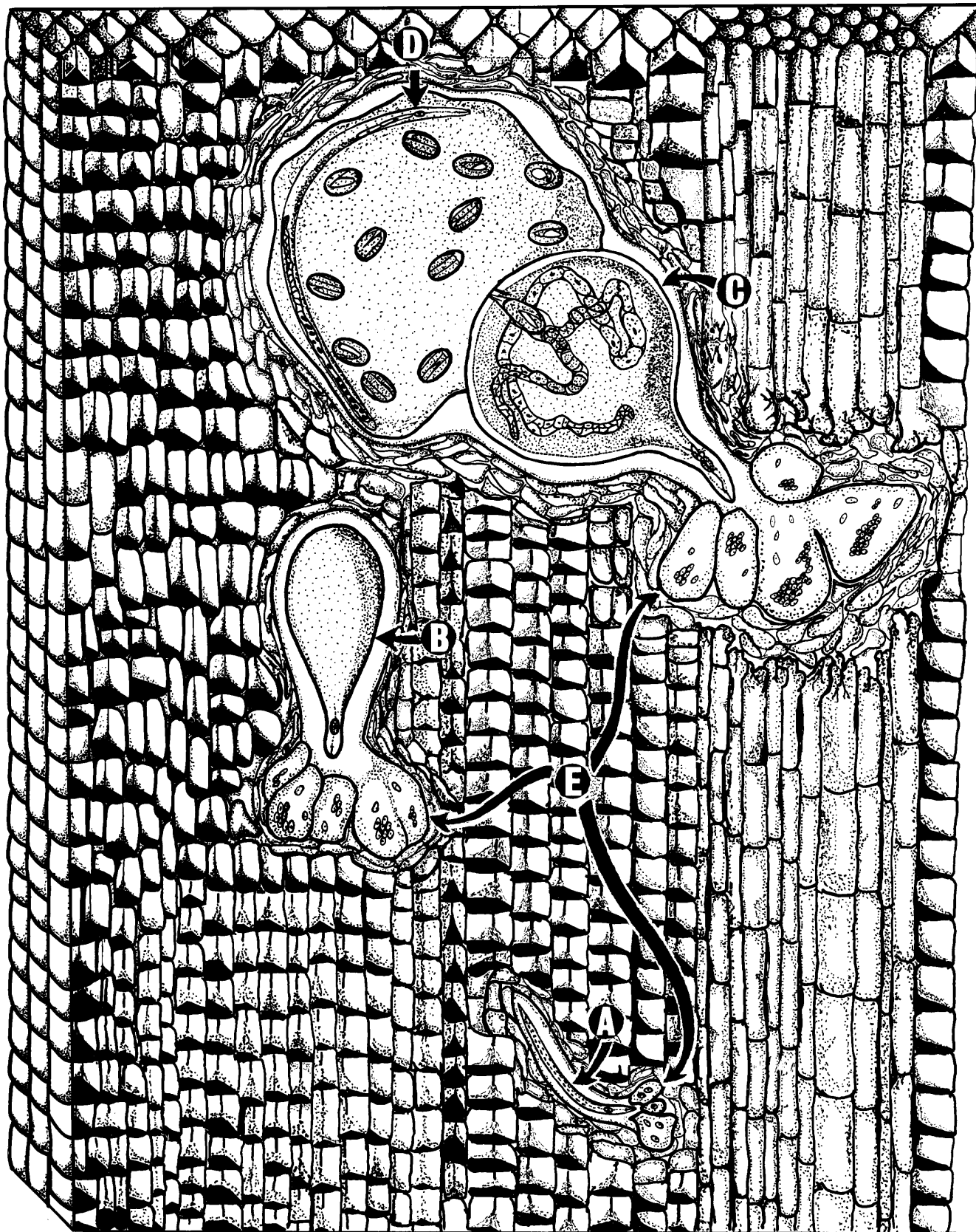


Figure 1. Root-knot nematode larvae (A) migrate to feeding site within host tissue. After feeding, young nematodes (B) become enlarged in a sedentary position. Sexually mature females (C) continue feeding in a sedentary position and are capable of producing several hundred eggs. Males (D) are long and slender, not resembling the female. Giant cells (E) serve as food reservoirs during feeding by the root-knot nematode.